Habitat 2.0: Training Home Assistants to Rearrange their Habitat

Year: 2021 | Citations: 618 | Authors: Andrew Szot, Alexander Clegg, Eric Undersander, Erik Wijmans, Yili Zhao

---

Abstract

We introduce Habitat 2.0 (H2.0), a simulation platform for training virtual robots in interactive 3D environments and complex physics-enabled scenarios. We make comprehensive contributions to all levels of the embodied AI stack - data, simulation, and benchmark tasks. Specifically, we present: (i) ReplicaCAD: an artist-authored, annotated, reconfigurable 3D dataset of apartments (matching real spaces) with articulated objects (e.g. cabinets and drawers that can open/close); (ii) H2.0: a high-performance physics-enabled 3D simulator with speeds exceeding 25,000 simulation steps per second (850x real-time) on an 8-GPU node, representing 100x speed-ups over prior work; and, (iii) Home Assistant Benchmark (HAB): a suite of common tasks for assistive robots (tidy the house, prepare groceries, set the table) that test a range of mobile manipulation capabilities. These large-scale engineering contributions allow us to systematically compare deep reinforcement learning (RL) at scale and classical sense-plan-act (SPA) pipelines in long-horizon structured tasks, with an emphasis on generalization to new objects, receptacles, and layouts. We find that (1) flat RL policies struggle on HAB compared to hierarchical ones; (2) a hierarchy with independent skills suffers from 'hand-off problems', and (3) SPA pipelines are more brittle than RL policies.